Unfair Pay and Health: The Effects of Perceived Injustice of Earnings on Physical Health

Schunck, Reinhard; Sauer, Carsten; Valet, Peter

This is a pre-copyedited, author-produced PDF of an article accepted for publication in **European Sociological Review, Vol. 31, 2015, No. 6, pp. 655-666** following peer review.
The version of record is available online at: https://doi.org/10.1093/esr/jcv065
Page numbers have been adjusted to the publishers version, whereby this postprint is fully quotable

Unfair Pay and Health: The Effects of Perceived Injustice of Earnings on Physical Health

Reinhard Schunck[1,2,*], Carsten Sauer[2] and Peter Valet[1,2]

[1]Department of Sociology, Bielefeld University, 33501 Bielefeld, Germany and [2]Collaborative Research Center 882 (SFB 882), Bielefeld University, 33501 Bielefeld, Germany

*Corresponding author. Email: reinhard.schunck@uni-bielefeld.de

Submitted August 2013; revised January 2015; accepted June 2015

Abstract
While there is ample evidence that income inequalities influence individuals' health status, the mechanisms behind this income inequality-health correlation are only partially understood. This study shows that inequalities evaluated on the basis of individual perceptions of injustice are a driving force behind this connection. Two main questions are addressed: Does perceiving one's earnings as unfair affect physical health? Do such perceptions contribute to structural health inequalities? The hypotheses presented are based on the effort-reward imbalance model, according to which experiencing injustice causes stress, which can have a negative effect on individual health. Analyses of large-scale longitudinal data from the German Socio-Economic Panel of the years 2005-2010 show that female employees who perceive their earnings as unjustly low display significantly worse physical health, and that if employees perceive their earnings to be unjust for an extended period, this contributes to the deterioration of individual physical health in male and female employees. Employees from lower social classes, in particular unskilled blue-collar workers, more frequently perceive their earnings to be unjust. Experience of unjust earnings mediates the relationship between social class and physical health, if to a limited extent. Our conclusion is that differential exposure to unjust earnings contributes to the emergence of structural health inequalities.

Introduction

Health inequalities among individuals with different incomes have been documented in a number of recent studies. Income inequality-health correlations exist both within and among societies (Präg et al., 2014). Wilkinson and Pickett (2010) argue that individuals' health status is not influenced by the actual gross domestic product or contributions to the health care system but by the extent of income inequality in a society: health is less good in societies where income differences are larger. Wilkinson and Pickett (2010) explain the income inequality-health correlation by the fact that higher inequality leads to status anxieties, and that these anxieties, coupled with low social capital, have a negative impact on individuals' health. This explanation has triggered a debate if status anxieties are really the driving force behind health inequalities, or whether health inequalities might rather be explained by other processes (Layte, 2012; Delhey and Dragolov, 2014; Layte and Whelan, 2014; Präg et al., 2014).

In this article, we offer a different explanation for the income inequality-health correlation. We argue that individual perceptions of unjust earnings cause feelings of

stress and thus impact health. Previous studies on the determinants of injustice perceptions show that not all groups of employees are affected equally by unfair pay; low-skilled employees, in particular, tend to perceive their earnings as unjustly low (Schunck et al., 2013). If perceptions of fair or unfair pay are unequally distributed, then this may be a source of structural health inequalities.

Research into the consequences of perceptions of injustice has shown that these perceptions increase shirking and absenteeism and decrease job satisfaction (Pritchard et al., 1972; Alexander and Ruderman, 1987; Sauer and Valet, 2013). Only a few studies have examined whether perceptions of earnings injustice have direct health effects. Yet, theoretical models (Siegrist and Theorell, 2006; Greenberg, 2010) and some empirical studies (Shaw and Gupta, 2001; Falk et al., 2011, 2014; Schunck et al., 2013) suggest that perceiving one's earnings as unjust can become a stressor and, thus, have tangible effects on health. However, important questions remain unanswered because most studies are based on laboratory experiments or on cross-sectional data (Shaw and Gupta, 2001; Falk et al., 2011). This makes it difficult to assess the results' external validity and the (causal) direction of the relationship. Moreover, because most of these studies use composite measures of work quality, it is impossible to assess the effect of unfair pay independently (Kuper et al., 2002). Also, little is known about the social stratification of the perceived injustice of earnings and if differential exposure to this stressor contributes to the emergence of health inequalities (Baum et al., 1999).

The aim of this study is to investigate (i) the effects of perceiving one's earnings as unjust on physical health, (ii) differences among social classes with regard to perceptions of income injustice, and (iii) if the relationship between class and physical health is mediated by perceptions of unjust pay.

To investigate this, we use longitudinal data from the Socio-Economic Panel (SOEP) study. The following sections discuss how perceptions of unjust earnings affect physical health, and how they are connected to individuals' relative position in the social stratification system.

Inequity and Health

The key theoretical assumption underlying this study is that an employment relationship between an employer and an employee is an exchange relationship in which the employee makes efforts (working hours, physical and mental input), in return for which he or she receives rewards such as pay, job security, career prospects, and status (Siegrist and Theorell, 2006; Goldthorpe, 2007).

This exchange relationship is based on the employee's expectation to be compensated equivalently (heteromorphic reciprocity, see Gouldner, 1960: p. 172) or adequately (Siegrist and Theorell, 2006).

To determine what might constitute adequate monetary compensation, employees make a justice evaluation (Jasso, 1978) by comparing their rewards with the rewards of ‘reference standards' (Markovsky et al., 2008). Reference standards may be specific individuals such as colleagues or partners (Adams, 1965) or abstract individuals such as employees with the same qualifications in the same occupation (Berger et al., 1972). By making such comparisons, employees arrive at a level of compensation that they consider to be just. Thus, earnings are considered to be just if the effort-reward ratio of ego is proportional to the effort-reward ratio of alter, whereas injustice or inequity is perceived if the effort-reward ratios of ego and alter are not in proportion to each other. Rewards can be regarded as unjustly low (underpayment) or as unjustly high (overpayment). In what follows, we focus on underpayment because the theoretical propositions concerning the health consequences of unjust earnings concern only underpayment. Overpayment may be a source of negative as well as positive emotions (Peters et al., 2008) and, as we shall see, it is relatively easy for employees to resolve inequity resulting from overpayment by increasing their efforts.

Generally speaking, there are two ways employees respond to being underpaid: they decide to terminate their current employment relationship and try to find a new job, or they try to adjust their efforts and/or their rewards to regain balance in their employment relationship. If employees do not have the opportunity to adjust their behaviour or if there is no way their rewards can be increased (e.g. by a raise), they remain in a situation in which they perceive themselves to be underpaid. Such lack of equivalence is referred to as effort-reward imbalance (ERI) (Siegrist and Theorell, 2006). An ERI causes emotional distress (Weiss et al., 1999), which in turn triggers autonomic arousal and neuroendocrine stress reactions (Markovsky, 1988; Falk et al., 2011) that can have a negative effect on physical health. There is ample empirical evidence linking experienced ERI distress to a range of physical health problems including increased risk of coronary heart disease, hypertension, type 2 diabetes, and musculoskeletal injuries (Joksimovic et al., 2002; Kuper et al., 2002; Kumari et al., 2004; van Vegchel et al., 2005).

In the context of ERI research, efforts and rewards are usually measured using a standardized tool, which covers a wide array of different dimensions of efforts and rewards (Siegrist et al., 2004). Because perceiving one's earnings as unjustly low is obviously indicative of

an imbalance between efforts and rewards, the justice evaluation of one's earnings can be considered as a suitable indicator of an ERI (Greenberg, 2010; Falk et al., 2011). Thus, our first hypothesis is: perceiving one's earnings as unjustly low has a negative effect on one's physical health. Given that experiencing stress for an extended period of time as a chronic strain may be particularly harmful to one's health (Pearlin et al., 2005), our second hypothesis is: the negative health effects of injustice perceptions will accumulate in proportion to the number of times employees perceive their earnings as unjustly low.

Social Stratification of Inequity Distress

In the previous section, we linked experience of inequity to physical health. However, the question remains as to whether exposure to this mechanism is socially stratified. As described above, the crucial point is whether employees have the opportunity to modify an ERI to regain balance between efforts and rewards. Whether or not such opportunities will present themselves depends, in particular, on the characteristics of the employment contract. Employees with specific contracts (e.g. labour contracts) are paid according to a measurable effort, such as piece rates, whereas the efforts of employees with diffuse contracts (e.g. in service relationships) are not as clearly measurable, and pay cannot be linked with efforts as easily (Goldthorpe, 2007: p. 108). Diffuse contracts are the standard form of employment contract for white-collar occupations, whereas specific contracts are commonly in use in blue-collar occupations (Goldthorpe, 2007: p. 110). A reduction of efforts to establish equity in an ERI is therefore often impracticable for blue-collar employees because it is readily noticeable and likely to entail even lower wages (e.g. if pay is based on a piece rate) or to have more severe consequences (e.g. job loss). For white-collar employees in a service relationship, however, it is less difficult to withdraw efforts without being noticed, because their efforts cannot be monitored as easily. In addition, to resolve the principle-agent problem, employers must ensure that their white-collar employees continue to be committed (Goldthorpe, 2007: p. 114), so it is less likely that employers will pay wages that their employees will consider to be too low.

Another way to resolve an ERI is by trying to find another job that offers more equitable conditions. Again, this can be assumed to be more difficult for blue-collar workers, in particular for unskilled workers, considering that demand for manual work has steadily declined as a result of continuing technological change and globalization (Fernandez, 2001). This, along with the relatively homogeneous pool of potential employees (Goldthorpe, 2007: p. 112), makes it easier for employers to keep wages low, with the result that more equitable alternatives are unavailable to blue-collar workers, particularly to unskilled workers (Siegrist and Theorell, 2006).

Table 1 shows the theoretical relationship between employees' social class (Erikson and Goldthorpe, 1992; Goldthorpe, 2007) and inequitable earnings. Blue-collar employees are more likely to be in a situation of ‘dependency' (Siegrist and Theorell, 2006) and, thus, are more likely to accept pay that they perceive as unfair. Therefore, our third hypothesis is: the extent to which employees perceive their earnings as unjustly low, and the frequency with which they experience their earnings as unjustly low, are inversely related to their class position.

If exposure to inequity distress is differentiated by social class, then perceiving earnings as too low may contribute to the emergence of structural health inequalities. If this is true, the well-documented association between social class and health could be mediated in part by the differential occurrence of inequity distress. Thus, our fourth hypothesis is: the relationship between social class and health is mediated by differing perceptions of injustice of earnings.

We check for gendered patterns in the association between perceived injustice of earnings and physical health because some previous research on work strain, labour market participation, and health has shown gender differences (Nelson and Burke, 2002).

Data, Variables, and Methods

The data to test our hypotheses were taken from the SOEP study (Wagner et al., 2007). The SOEP is an annual large-scale longitudinal survey of more than 20,000 individuals in about 11,000 households. First conducted in 1984, it covers a wide range of characteristics, including household composition, occupational biography, employment, earnings, satisfaction indicators, and, more recently, health. Given that the variables relevant for testing our hypothesis were queried between 2005 and 2010, our study is limited to this period. The analysis sample covers working-age respondents (i.e. ages 18-65 years) who were in full-time, part-time, or marginal employment for at least 2 years in that period. Self-employed individuals and employers are excluded, as are trainees; these groups may experience ERI as well, but they do not receive any earnings from an employer and are not bound by any employment regulations, two characteristics that are constitutive for our argument. Our sample consists of

Table 1. Social class and ERI

Class	Employment regulation	Difficulty of monitoring employee's effort	Capacity to influence ERI
Higher-level managers and professionals (I)	Service relationship	High	High
Lower-level managers and professionals (II)	Service relationship	High	High
Routine service and sales (III)	Combination of service relationship and labour contract	Mixed	Mixed
Skilled manual workers (VI)	Labour contract	Low	Low
Unskilled manual workers (VII)	Labour contract	Low	Low

Note: Self-employed individuals (e.g. farmers) and employers (IV) excluded; manual foremen (V) not assigned in the SOEP.

9,773 respondents, each of whom was interviewed up to three times, leading to a total of 19,629 observations.

The outcome variable ‘physical health' is measured using the physical component summary (PCS) score of the SOEP's version of the SF-12 Health Survey (Andersen et al., 2007); it has been measured by the SOEP every other year since 2004. Following suggestions in the literature (Wilson et al., 2000), individual PCS scores were generated by conducting a confirmatory factor analysis using the six questions on physical health (see Supplementary Figure A1). The PCS is standardized to a (sample) mean of 50, and a standard deviation of 10. The PCS is thus a composite measure of physical health, with higher values indicating better health. Because of the restriction to working respondents, the mean PCS score in our sample (52.2) is slightly higher than in the overall population (see Supplementary Table A1).

The main predictor variable is the justice perception of one's earnings. It is generated from two measures: one's actual earnings and the earnings one considers to be just. While actual earnings are queried directly each year, just earnings have been surveyed as part of the SOEP every other year since 2005. Based on this information, we calculated the individual injustice evaluation J, using the negative logarithmic ratio of actual and just earnings (Jasso, 1978): $J = -1 * \ln(A/C)$, where A is the actual monthly net earnings, and C is the monthly net earnings considered to be just. To allow for an easier interpretation, we computed the inverse of the justice evaluation. If just earnings and actual earnings are equal, then $J = 0$, and effort and rewards are equitable. If just earnings exceed actual earnings, then J is positive and the respondent feels underpaid; if actual earnings exceed just earnings, then J is negative and the respondent feels overpaid. To test our second hypothesis – i.e. that the negative health effects of injustice perceptions will accumulate in proportion to the number of times employees perceive their earnings as unjustly low—we computed the frequency with which respondents perceive their earnings to be unjustly low. Because the observation window ranges from 2005 to 2010 and individuals can thus have perceived their earnings as unjust only in 2005, 2007, and 2009, the maximum value of this measure is 3. With PCS and J being included in the SOEP in alternate years, PCS is used as a lead dependent variable, which provides some protection against the problem of reverse causality.[1]

In addition, we controlled for gender, age, living in East Germany, migration background (first-and second-generation immigrants are identified by their and their parents' country of birth, respectively), OECD-equivalized net annual household income (in €1,000) to assess households' material resources, years of schooling, working full-time (1 = yes), actual working hours per week, working long hours (i.e. working more than the contractually agreed hours; 1 = yes), working in the public sector (1 = yes), and regular exercise (at least once a week = 1) as a proxy for class-specific differences in health behaviour. The respondents' class position is operationalized through the SOEP's version of the EGP (Erikson-Goldthorpe-Portocarero) (Erikson et al., 1979) class scheme (SOEP, 2012). Because information on supervisory status has only been included in the SOEP since 2007 (SOEP, 2012), Category V (manual foremen) is not assigned. Self-employed respondents and employers (IV) were excluded from our sample. We thus distinguish between five classes (I, II, III, VI, and VII). The main rationale for using the EGP class scheme is that the classes can be differentiated according to the way the employment relationship is regulated (Goldthorpe, 2007).[2]

As noted above, one way to resolve an ERI is by finding another job. In conducting the multivariate analysis, we therefore also controlled for job changes between the times when the dependent (PCS) and independent variables were measured. Potential period effects were controlled for by including year dummies.
Analysis involved two steps. The first set of analyses was conducted to assess the hypothesized relationship between unjustly low earnings and physical health. These analyses used fixed-effects linear regression models to examine whether the justice evaluation (H1) and the number of times respondents report unjustly low earnings (H2) affect PCS. The fixed-effects linear model is given as:

$$(y_{it} - \bar{y}_i) = \beta(x_{it} - \bar{x}_i) + \gamma(c_{it} - \bar{c}_i) + (\varepsilon_{it} - \bar{\varepsilon}_i) \quad (1)$$

where y_{it} is the dependent variable (PCS), x_{it} is a time-varying independent variable (*J* or the frequency of unjust earnings), β is the associated regression weight, c_{it} is a matrix of time-varying control variables, γ is a vector of associated regression weights, and ε_{it} is the idiosyncratic error. Fixed-effects models use only within-variation to estimate effects and, therefore, control for all time-constant unobserved heterogeneity (Wooldridge, 2010) such as unobserved biological and psychological dispositions that may influence respondents' evaluation of earnings as well as their physical health. Because (sufficient) within-variation is necessary to estimate the effect of variables in these models, time-constant variables such as gender, as well as quasi-time-constant variables such as class position, level of education, and place of residence, were not included. However, it is possible to include interaction with time-constant variables (e.g. gender and the injustice evaluation).
Because H3 and H4 focus primarily on differences between respondents – i.e. between respondents of different social class – application of fixed-effects models is impracticable, particularly in the German context, where there is little vertical mobility in the life course compared with other countries (Allmendinger, 1989). We therefore estimated random-effects models, which are given as:

$$y_{it} = \alpha + \beta x_{it} + \gamma c_{it} + \nu_i + \varepsilon_{it}, \quad (2)$$

where ν_i is the level-2 error (the random intercept), and all other variables represent the same as in Equation 1. These models use both within- and between-individual variation and are thus able to estimate the effect of (quasi-)time-constant variables (Wooldridge, 2010). Hypothesis 4, the mediation hypothesis, was tested through a multilevel mediation analysis using a two-level structural-equation mediation model (Preacher et al., 2010; Delhey and Dragolov, 2014), which is given as:

$$m_{it} = \alpha + \beta x_{it} + \gamma c_{it} + \nu_i + \varepsilon_{it} \quad (3)$$

$$y_{it} = \alpha + \beta' x_{it} + \rho m_{it} + \gamma c_{it} + \nu_i + \varepsilon_{it,} \quad (4)$$

here x_{it} is the initial variable (class position), m_{it} is the mediator (frequency of unjust earnings), and y_{it} is the outcome (PCS). Because the initial variable is categorical (five EGP classes), there are four indirect effects, $\beta_j \rho$, one for each class, except the reference category. The total indirect effect is given as $\sum_1^{j-1} \beta_j p$ and the amount mediated is given as the proportion of the indirect effect to the total effect $\sum_1^{j-1} \beta_j p \ / \ (\sum_1^{j-1} \beta_j p + \beta'_j)$. Clustered standard errors (SEs) were computed to adjust for potential heteroscedasticity and (serial) correlation within clusters (Wooldridge, 2010). All analyses were conducted using Stata 13.1. Supplementary Table A1 provides descriptive statistics on the variables used in the analysis and information on the sample.

Results

In the following, we first report descriptive results on the distribution of earnings inequity and physical health. Second, we present the results of the fixed-effects regressions to determine whether injustice perceptions of one's earnings have an effect on physical health (H1 and H2). Third, we report results on the relationship between social class and the injustice perception of one's earnings, and on the mediation between class and physical health (H3 and H4).
The majority of respondents (66.4 per cent) consider their earnings to be just; slightly fewer than one third (33.1 per cent) feel underpaid (see Supplementary Table A1); and a small proportion of respondents (0.50 per cent) think that they earn more than they deserve. The average injustice evaluation is 0.125, which indicates that respondents believe that they earn ((1 - $e^{0.125}$)*100 =) 13.31 percentage points less than they think they deserve. However, this applies to the sample as a whole – among those respondents who feel underpaid, the average injustice evaluation is 0.383, indicating that they perceive their earnings to be 46.67 percentage points too low. Women perceive their earnings as significantly more unfair (J=0.135, as opposed to men: J=0.117, P<0.001), but there are no statistically significant gender differences with regard to the proportion of respondents who consider their earnings to be unjust, or with regard to the frequency with which earnings are perceived as unjust (see Supplementary Table A2).

Table 2 shows bivariate associations among social class, measures of injustice, and physical health. As can be seen, all measures of injustice and health vary significantly among social classes. Employees in lower social classes perceive their earnings as more unjust than employees in higher social classes do theirs. Moreover, the lower the social-class position, the higher the proportion of employees who perceive their earnings as unjust. Employees in lower social classes also perceive their earnings to be unjust more frequently than employees in any other social class do theirs. Table 2 also shows the well-documented association between social class and health that the higher an employee's class position, the better his or her reported PCS (Bartley, 2004).

Injustice Perceptions and Physical Health

Table 3 presents the results of the linear fixed-effects analyses conducted to determine whether changes in injustice evaluations lead to changes in health. Model 1 shows a negative significant effect, which indicates that employees who consider their earnings to be unjust experience deterioration in health, thus supporting our H1. Model 2 shows single interactions between changes in injustice evaluations and gender, which reveal that the association in Model 1 is primarily the result of the respondents' gender. While there is no statistically significant effect for men, the effect for women is statistically significant. A Wald test confirms that the coefficients for men and women differ statistically from one another ($P < 0.05$).

Model 3 includes the frequency with which employees perceive their earnings as unjust. The negative effect indicates that employees who frequently perceive their earnings as unjust also experience a decline in health. Model 4 shows interactions between the frequency with which earnings are perceived as unjust and gender. In contrast to Model 2, there is no indication in Model 4 of any gender-specific effects of the frequency with which earnings are perceived as unjust. A Wald test confirms this result ($P = 0.60$), indicating that the coefficients for men and women do not differ significantly.[3]

Injustice Perceptions and Socio-Economic Position

Tables 4 and 5 present the results of the second set of analyses that were conducted to determine how injustice evaluations and frequently experienced injustice are related to employees' class positions, and how injustice perceptions mediate the relationship between social class and health.

Table 4 estimates the effects of social class on injustice evaluations (Model 1) and on the frequency with which earnings are perceived as unjust (Model 2). Model 1 shows that unskilled manual workers perceive their earnings to be less just compared with higher-level managers and professionals. Employees who belong to the other classes do not differ significantly in their justice evaluations.

With regard to the frequency of injustice experiences (Model 2), the results indicate that managers and professionals are less likely to perceive their earnings as unjust. Moreover, there is no significant difference between lower-level managers and professionals and between higher-level managers and professionals. Lower social classes, however, appear to perceive their earnings as unjust more frequently.[4] The results of Wald tests confirm that social class has an overall effect on the frequency with which earnings are perceived as unjust ($P < 0.001$), and that the coefficients are different from one another ($P < 0.001$). Therefore, the results partly support H3. The frequency with which earnings are

Table 2. Measures of unjust earnings and physical health differentiated by social class (N = 19,629)

	Mean			
Class	**PCS**	**Injustice evaluation (J)**	**Unjust earnings (proportion)**	**Frequency of earnings being considered unjust[a]**
Higher-level managers and professionals (I)	54.03	0.112	0.256	0.363
Lower-level managers and professionals (II)	52.55	0.105	0.282	0.406
Routine service and sales (III)	51.80	0.127	0.338	0.496
Skilled manual workers (IV)	51.84	0.131	0.380	0.569
Unskilled manual workers (V)	50.63	0.165	0.435	0.645

[a]The frequency can take the maximum value of 3 in our data, as earnings justice is inquired only in 3 years.

Notes: F-test PCS: $F(4, 19{,}624) = 81.936$, $P < 0.001$; F-test injustice evaluation: $F(4, 19{,}624) = 33.00$, $P<0.001$; F-test frequency of inequity: $F(4, 19{,}624) = 80.523$, $P < 0.001$; x^2 proportion inequity: $x^2(4) = 321.272$, $P < 0.001$.

Source: SOEPv28, own computations.

perceived as unjust is stratified by social class, indicating that employees in lower classes are more likely to frequently consider their earnings to be unjust. With regard to injustice evaluations, our findings indicate that only unskilled manual workers perceive their earnings as more unjust than employees from other social classes do theirs. Additional analyses show that there are no gender differences in the relationship between social class and the measures of injustice used (see Supplementary Table A5).

Table 5 shows the effects of the multilevel mediation analysis conducted to determine whether the relationship between social class and physical health was mediated by injustice evaluations. Because the preceding analyses suggest that the relationship between social class and frequency with which earnings are perceived as unjust is stronger, the mediation analysis concentrates on the mediating role of repeated injustice perceptions. Moreover, because this relationship is not moderated by gender (see Supplementary Table A5), we present a joint model for men and women. The results of the first equation again show that repeated injustice evaluations have a negative effect on employees' physical health (Table 5, Equation 1). In addition, it is evident that employees belonging to higher social classes have considerably better physical health than do employees from lower social classes. We are thus able to reproduce the well-known association between social class and health. The second equation (see Table 5, Equation 2) again shows that individuals from lower social classes more frequently perceive their earnings as unjust. The rightmost column of Table 5 shows the result of interest, the indirect effects. They illustrate that the relationship between social class and physical health is mediated in part by the frequency with which earnings are perceived as unjust. The total direct effect is estimated as -3.18 (SE = 0.718), and the total indirect effect as -0.244 (SE = 0.050). Thus, around 6.58 per cent of the relationship between social class and physical health results from the experience of unjust earnings. This supports H4, although the mediating effect is comparatively small.

Table 3. Fixed-effects regression models predicting PCS

	1		2		3		4	
Predictors	b	SE	b	SE	b	SE	b	SE
Injustice evaluation	−0.651*	(0.281)						
Injustice evaluation × male			−0.105	(0.341)				
Injustice evaluation × female			−1.332**	(0.466)				
Frequency of perceiving earnings as unjust					−0.226*	(0.100)		
Frequency of perceiving earnings as unjust × male							−0.182	(0.124)
Frequency of perceiving earnings as unjust × female							−0.284	(0.154)
Equivalized annual net household income (in €1,000)	0.006	(0.006)	0.006	(0.006)	0.006	(0.006)	0.006	(0.006)
Full-time (1 = yes)	0.065	(0.334)	0.060	(0.334)	0.079	(0.334)	0.076	(0.334)
Actual working hours per week	−0.026*	(0.012)	−0.026*	(0.012)	−0.026*	(0.012)	−0.026*	(0.012)
Working more than contractual hours (1 = yes)	0.132	(0.140)	0.137	(0.140)	0.134	(0.140)	0.135	(0.140)
Public sector (1 = yes)	−0.517	(0.310)	−0.516	(0.310)	−0.526	(0.310)	−0.527	(0.310)
Age	−0.312***	(0.028)	−0.311***	(0.028)	−0.290***	(0.030)	−0.290***	(0.030)
Married (1 = yes)	−0.558	(0.329)	−0.546	(0.329)	−0.558	(0.329)	−0.559	(0.329)
Regular exercise or sport (1 = yes)	0.400*	(0.161)	0.401*	(0.161)	0.390*	(0.161)	0.391*	(0.161)
Constant	66.956***	(1.278)	66.934***	(1.278)	66.043***	(1.331)	66.032***	(1.331)
R^2 (within)	0.019		0.020		0.019		0.019	
Observations	19,629		19,629		19,629		19,629	
Respondents	9,773		9,773		9,773		9,773	

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.

Note: Year of survey and job changes controlled for; cluster robust standard errors in parentheses.

Source: SOEPv28, own computations.

Table 4. Random-effects regression models predicting injustice evaluations and frequency of perceiving earnings as unjust

	1		2	
	Injustice evaluation		Frequency of perceiving earnings as unjust	
Predictors	b	SE	b	SE
Higher-level managers and professionals (I)	Ref.		Ref.	
Lower-level managers and professionals (II)	−0.012	(0.007)	0.030	(0.017)
Routine service and sales (III)	−0.010	(0.008)	0.093***	(0.021)
Skilled manual workers (IV)	0.002	(0.009)	0.132***	(0.025)
Unskilled manual workers (V)	0.025**	(0.009)	0.184***	(0.024)
Equivalized annual net household income (in €1,000)	−0.001***	(0.000)	−0.004***	(0.001)
Years of education	0.001	(0.001)	−0.000	(0.003)
Full-time (1 = yes)	−0.043***	(0.008)	0.007	(0.021)
Actual working hours per week	0.002***	(0.000)	0.008***	(0.001)
Long hours (1 = yes)	0.013***	(0.004)	0.064***	(0.011)
Public sector (1 = yes)	−0.016***	(0.005)	−0.013	(0.014)
Age	−0.000	(0.000)	0.003***	(0.001)
Female (1 = yes)	0.027***	(0.006)	0.079***	(0.017)
Married (1 = yes)	−0.008	(0.005)	−0.064***	(0.015)
Living in East Germany (1 = yes)	0.082***	(0.006)	0.191***	(0.018)
Migration background (1 = yes)	0.029***	(0.007)	0.082***	(0.020)
Regular exercise or sport (1 = yes)	−0.007	(0.004)	−0.050***	(0.011)
Constant	0.056*	(0.022)	0.174**	(0.059)
R^2 (overall)	0.053		0.098	
Observations	19,629		19,629	
Respondents	9,773		9,773	

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.
Note: Year of survey and job changes controlled for; cluster robust standard errors in parentheses.
Source: SOEPv28, own computations.

Discussion

Drawing on the recent debate on the income inequality-health correlation, our study investigated whether injustice perceptions of earnings influence individual health, and if they do, how this might contribute to the emergence of health inequalities among social classes. We began by hypothesizing that perceiving one's earnings as unjustly low leads to a poorer health status. Moreover, we argued that the frequency with which individuals perceive their earnings as unjust has a cumulative effect on their health. We then established relationships between injustice perceptions and social classes and between injustice perceptions and health inequalities. We argued that earnings are more frequently perceived as unjust by members of the lower social classes, and that perceived injustice mediates the association between health and social class.

The results of our analyses largely support our hypotheses: earnings perceived as unjustly low affect physical health. While previous research indicates that perceived injustice may cause symptoms of stress (Markovsky, 1988; Falk et al., 2011), our study is the first to show that the extent to which employees perceive their earnings as unjustly low is associated with deterioration in physical health. Surprisingly, this connection could be found only for female employees. One possible explanation is that women are more vulnerable to work-related stressors such as unjust pay because they receive less support than men and have to manage multiple roles at once (Bratberg et al., 2002; Nelson and Burke, 2002). This is a problem that may be more serious in Germany and other conservative welfare states, where women are often secondary earners (Rosenfeld et al., 2004) and where they are under more pressure to justify having a job in the first place because it contributes less to the household income. As a result, women might find it more difficult to express their perceptions of injustice and to cope with the perceived injustice. It would be particularly interesting to explore this issue with regard

Table 5. Multilevel structural equation model

Predictors	Equation 4: PCS score b	SE	Equation 3: frequency of perceiving earnings as unjust b	SE	Indirect effects: frequency of perceiving earnings as unjust (Equation 4) × social class (Equation 3) b	SE
Frequency of perceiving earnings as unjust	−0.561***	(0.077)				
Higher-level managers and professionals (I)	Ref.		Ref.		Ref.	
Lower-level managers and professionals (II)	−0.547**	(0.176)	0.026	(0.017)	−0.015	(0.010)
Routine service and sales (III)	−0.437*	(0.214)	0.082***	(0.021)	−0.046***	(0.013)
Skilled manual workers (IV)	−0.978***	(0.246)	0.121***	(0.025)	−0.068***	(0.017)
Unskilled manual workers (V)	−1.217***	(0.251)	0.170***	(0.024)	−0.096***	(0.019)
Equivalized annual net household income (in €1,000)	0.019***	(0.005)	−0.004***	(0.001)		
Years of education	0.350***	(0.031)	−0.001	(0.003)		
Full-time (1 = yes)	0.202	(0.216)	0.009	(0.021)		
Actual working hours per week	−0.034***	(0.008)	0.008***	(0.001)		
Long hours (1 = yes)	−0.153	(0.113)	0.061***	(0.011)		
Public sector (1 = yes)	−0.559***	(0.151)	−0.014	(0.014)		
Age	−0.184***	(0.008)	0.002***	(0.001)		
Female (1 = yes)	−1.684***	(0.175)	0.077***	(0.017)		
Married (1 = yes)	−0.174	(0.159)	−0.062***	(0.015)		
Living in East Germany (1 = yes)	−0.335	(0.178)	0.191***	(0.018)		
Migration background (1 = yes)	0.140	(0.216)	0.083***	(0.020)		
Regular exercise or sport (1 = yes)	1.081***	(0.117)	−0.049***	(0.011)		
Constant	57.699***	(0.629)	0.201***	(0.059)		
Equation 4: Variance level 2	34.746					
Equation 4: Variance level 1	26.086					
Equation 3: Variance level 2	0.251					
Equation 3: Variance level 1	0.277					
Log pseudolikelihood	−86117.425					
N: Individuals	9,773					
N: Observations	19,629					

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.
Note: Year of survey and job changes controlled for; cluster robust standard errors in parentheses.
Source: SOEPv28, own computations.

to the gender-wage gap, which is comparatively high in Germany. However, these reflections are tentative, and further research is needed to investigate the role of gender in greater detail.

Although we did find gender differences in the extent to which respondents perceived earnings as unjust, frequent experiences of unfair pay have the same detrimental effect on health in men and women. Given that our observation period was rather short (2005-2010), one can assume that, if sustained over a longer period of time, the negative impact of frequent experiences of unjust payment on health may be even stronger.

We also found evidence that experiencing unfair pay partially mediates the association between social class and physical health. With the exception of unskilled manual workers, who perceive their earnings to be too low, employees from different social classes do not differ in their justice evaluation if possible confounders are controlled for. However, there is clearly a social gradient in the frequency of experiencing unfair pay. This suggests that, while all employees may receive unjust earnings at some point, the capacity to act on a situation of inequity is stratified by social class. The conclusion to be drawn from this is apparent: there is differential exposure to inequity distress (Baum et al., 1999; Pearlin et al., 2005), which in turn contributes to the emergence of overall class inequalities in health. However, the mediation effect is relatively small. But it should be noted that this effect occurs under control of important confounders such as material resources and education, which also cause health inequalities among social groups.

It would be interesting to conduct a comparative analysis of the association between perceived injustice of earnings and health inequalities in different countries, with a focus on examining how the degree of inequality at the country level affects individual justice perceptions and, thus, health. The German context may be specific, and not only because of the prevalent gender relations; the country's educational system is characterized by a high degree of specificity and hierarchization, and is closely connected to the labour market, with the result that vertical mobility over the life course is limited (Allmendinger, 1989; Kerckhoff, 2001). However, we believe that the micro-mechanism generally holds, as evidenced by research on ERI in different countries (Siegrist et al., 2004). In a comparative perspective, two dimensions are likely to be important, namely the magnitude of inequality and the principles that underlie the distribution of resources (Janmaat, 2013). Evaluating something as just or unjust necessarily involves a comparison against reference standards (Markovsky et al., 2008). It may be the case that the wider the income distribution, the more likely employees will evaluate their earnings as unjust. But, if inequality is seen as legitimate because, for example, it is attributed to differences in effort, it is unlikely that a wider income distribution will be associated with a higher degree of perceived injustice of earnings. Thus, whether earnings are perceived as unjust may depend on the amount of inequality and how it is appraised (Forsé, 2009). If the data needed to address these questions become available, it may be possible to gain more insight into the role of perceptions of injustice in the association between inequality and health (Wilkinson and Pickett, 2010; Layte, 2012; Delhey and Dragolov, 2014; Layte and Whelan, 2014; Präg et al., 2014).

This study has a number of shortcomings that have to be considered. First, we rely on a stress-theoretical model, although we have no direct measure of stress (Bartley, 2004: p. 84); future studies would benefit from incorporating direct measures of stress. Second, while social class has been shown to be an important predictor of exposure to unfair earnings, it is only a proxy for the characteristics of the employment relationship (Goldthorpe, 2007), which, we assume, causes differential exposure. The current data do not allow us to test the assumed mechanism directly at the level of the employment relationship; a direct measure of the employment relationship characteristics would strengthen our argument. Third, to make a step towards bridging the gap between research on inequity and research on ERI (Greenberg, 2010; Falk et al., 2011), we have argued that injustice of earnings is reflective of an ERI. We think that there are sound theoretical arguments that allow using injustice of earnings as a proxy for an ERI. However, it would be interesting to test the equivalence of an ERI measure and the justice evaluation empirically. Lastly, our theoretical and empirical analyses focus exclusively on individuals who are employed and thus on health inequalities only among employees.

In conclusion, our study shows that earnings that are perceived as unjustly low have a negative effect on physical health. Women who perceive their earnings as unjustly low display a significantly worse physical health status than women who perceive their earnings as just. Frequent experiences of unfair pay appear to have a detrimental effect on physical health in both men and women. These experiences are stratified by social class. If employees from lower social classes, whose employment relation is regulated by a labour contract (e.g. manual workers), are confronted with an ERI, they have fewer opportunities than members of other social classes to re-establish equity by finding another job or by modifying the effort-reward ratio within their current employment relationship. Thus, the association between social class and health is mediated in part by differential exposure to unjust earnings. These unjust earnings cause inequity distress and thus contribute to the emergence of health inequalities in society.

Notes

1. Additional analyses involving a simultaneous measurement of health (subjective health status, see Supplementary Appendix) provide similar results, suggesting that the current results are not an artefact caused by the temporal lag between dependent and independent variables.
2. We would like to thank the anonymous reviewer for pointing out that the interpretation of the EGP class scheme on the basis of the ways employment relationships are regulated was provided long after the class scheme had been established (Erikson et al., 1979). If the primary interest were to assess individuals' socio-economic position in society, the dominance principle (Vandecasteele, 2011) – according to which a household's social position depends on the occupational and educational position of household's main breadwinner – would be more useful to assign class positions.
3. Separate models for men and women are presented in the Supplementary Appendix.
4. To allow for easy interpretation, a random-effects linear model was computed, although the frequency of inequity experiences is a count variable

(Wooldridge, 2010). However, different model specifications (e.g. a random-effects Poisson model) provide similar results and have no bearing on the interpretation (see Supplementary Appendix).

Acknowledgements

The authors thank Andres Cardona, Katrin Golsch, Maja Djundeva, two anonymous reviewers, and the editor for their helpful comments and suggestions.

Funding

This research was supported by the Collaborative Research Center 882 (SFB 882) at Bielefeld University, funded by the German Science Foundation (DFG).

Supplementary Data

Supplementary data are available at ESR online.

References

Adams, J. S. (1965). Inequity in social exchange. In Berkowitz, L. (Ed.), Advances in Experimental Social Psychology. New York: Academic Press, pp. 267-299.

Alexander, S. and Ruderman, M. (1987). The role of procedural and distributive justice in organizational behavior. Social Justice Research, 1, 177-198.

Allmendinger, J. (1989). Educational systems and labor market outcomes. European Sociological Review, 5, 231-250.

Andersen, H. H. et al. (2007). Computation of Standard Values for Physical and Mental Health Scale Scores Using the SOEP Version of the SF12v2. Schmollers Jahrbuch, 127, 171-182.

Bartley, M. (2004). Health Inequality. An Introduction to Theories, Concepts, and Methods. Cambridge, UK: Polity Press.

Baum, A., Garofalo, J. P. and Yali, A. M. (1999). Socioeconomic status and chronic stress: does stress account for SES effects on health? Annals of the New York Academy of Sciences, 896 , 131-144.

Berger, J. et al. (1972). Structural aspects of distributive justice: a status value formulation. In Berger, J., Zelditch, M. and Anderson, B. (Eds.), Sociological Theories in Progress. Boston: Houghton Mifflin, pp. 119-146.

Bratberg, E., Dahl, S. A. and Risa, A. E. (2002). 'The double burden': do combinations of career and family obligations increase sickness absence among women? European Sociological Review, 18, 233-249.

Delhey, J. and Dragolov, G. (2014). Why inequality makes europeans less happy: the role of distrust, status anxiety, and perceived conflict. European Sociological Review, 30, 151-165.

Erikson, R. and Goldthorpe, J. H. (1992). The Constant Flux. A Study of Class Mobility in Industrial Societies. Oxford: Clarendon Press.

Erikson, R., Goldthorpe, J. H. and Portocarero, L. (1979). Intergenerational class mobility in 3 Western European Societies – England, France and Sweden. British Journal of Sociology, 30, 415-441.

Falk, A. et al. (2011). Cardiovascular consequences of unfair pay. SOEPpapers on Multidisciplinary Panel Data Research, 380, 1-25.

Falk, A. et al. (2014). Unfair pay and health. SOEPpapers on Multidisciplinary Panel Data Research, 715, 1-25.

Fernandez, R. M. (2001). Skill-biased technological change and wage inequality: evidence from a plant retooling. American Journal of Sociology, 107, 273-320.

Forsé, M. (2009). Macro-inequalities and micro-justice. In Haller, M., Jowell, R. and Smith, T. W. (Eds.), The International Social Survey Programme, 1984-2009: Charting the Globe. New York: Abingdon, pp. 91-105.

Goldthorpe, J. H. (2007). On Sociology.Volume Two: Illustration and Retrospect. Stanford: Stanford University Press.

Gouldner, A. W. (1960). The norm of reciprocity: a preliminary statement. American Sociological Review, 25, 161-178.

Greenberg, J. (2010). Organizational injustice as an occupational health risk. The Academy of Management Annals, 4, 205-243.

Janmaat, J. G. (2013). Subjective inequality: a review of international comparative studies on people's views about inequality. European Journal of Sociology, 54, 357-389.

Jasso, G. (1978). On the justice of earnings: a new specification of the justice evaluation function. American Journal of Sociology, 83, 1398-1419.

Joksimovic, L. et al. (2002). Perceived work stress, overcommitment, and self-reported musculoskeletal pain: a cross-sectional investigation. International Journal of Behavioral Medicine, 9, 122-138.

Kerckhoff, A. C. (2001). Education and social stratification processes in comparative perspective. Sociology of Education, 74, 3-18.

Kumari, M., Head, J. and Marmot, M. (2004). Prospective study of social and other risk factors for incidence of type 2 diabetes in the Whitehall II Study. Archives of Internal Medicine, 164, 1873-1880.

Kuper, H. et al. (2002). When reciprocity fails: effort-reward imbalance in relation to coronary heart disease and health functioning within the Whitehall II study. Occupational and Environmental Medicine, 59, 777-784.

Layte, R. (2012). The association between income inequality and mental health: testing status anxiety, social capital, and neo-materialist explanations. European Sociological Review, 28, 498-511.

Layte, R. and Whelan, C. T. (2014). Who feels inferior? A test of the status anxiety hypothesis of social inequalities in health. European Sociological Review, 30, 525-353.

Markovsky, B. (1988). Injustice and arousal. Social Justice Research, 2, 223-233.

Markovsky, B. et al. (2008). Modularizing and integrating theories of justice. In Hegtvedt, K. A. and Clay-Warner, J. (Eds.), Justice (Advances in Group Processes Vol. 25). Bingley: Emerald, pp. 211-237.

Nelson, D. L. and Burke, R. J. (2002). Gender, Work Stress, and Health. Washington: American Psychological Assocation.

Pearlin, L. I. et al. (2005). Stress, health, and the life course: some conceptual perspectives. Journal of Health and Social Behavior, 46, 205-219.

Peters, S., Bos, K.v.d. and Karremans, J. (2008). On the psychology of the advantaged: how people react to being overpaid. Social Justice Research, 21, 179-191.

Präg, P., Mills, M. and Wittek, R. (2014). Income and inequality as social determinants of health: do social comparisons play a role? European Sociological Review, 30, 218-229.

Preacher, K. J., Zyphur, M. J. and Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. Psychological Methods, 15, 209-233.

Pritchard, R. D., Dunnette, M. D. and Gorgenson, D. O. (1972). Effects of perceptions of equity and inequity on worker performance and satisfaction. Journal of Applied Psychology, 56, 75-94.

Rosenfeld, R. A., Trappe, H. and Gornick, J. C. (2004). Gender and work in germany: before and after reunification. Annual Review of Sociology, 30, 103-124.

Sauer, C. and Valet, P. (2013). Less is sometimes more: consequences of overpayment on job satisfaction and absenteeism. Social Justice Research, 26, 132-150.

Schunck, R., Sauer, C. and Valet, P. (2013). Macht Ungerechtigkeit krank? Gesundheitliche Folgen von Einkommens(un)gerechtigkeit. WSI Mitteilungen, 66, 553-561.

Shaw, J. D. and Gupta, N. (2001). Pay fairness and employee outcomes: exacerbation and attenuation effects of financial need. Journal of Occupational and Organizational Psychology, 74, 299-320.

Siegrist, J. et al. (2004). The measurement of effort-reward imbalance at work: European comparisons. Social Science and Medicine, 58, 1483-1499.

Siegrist, J. and Theorell, T. (2006). Socio-economic position and health. the role of work and employment. In Siegrist, J. and Marmot, M. (Eds.), Social Inequalities in Health: New Evidence and Policy Implications. Oxford: Oxford University Press, pp. 73-97.

SOEP (2012). Documentation PGEN. Berlin: German Institute for Economic Research, German Socio-Economic Panel Study (SOEP).

van Vegchel, N. et al. (2005). Reviewing the effort-reward imbalance model: drawing up the balance of 45 empirical studies. Social Science and Medicine, 60, 1117-1131.

Vandecasteele, L. (2011). Life course risks or cumulative disadvantage? The structuring effect of social stratification determinants and life course events on poverty transitions in Europe. European Sociological Review, 27, 246-263.

Wagner, G. G., Frick, J. R. and Schupp, J. (2007). The German Socio-Economic Panel Study (SOEP) – scope, evolution and enhancements. Schmollers Jahrbuch, 127, 139-169.

Weiss, H. M., Suckow, K. and Cropanzano, R. (1999). Effects of justice conditions on discrete emotions. Journal of Applied Psychology, 84, 786-794.

Wilkinson, R. G. and Pickett, K. E. (2010). The Spirit Level: Why Equality is Better for Everyone. London, New York: Penguin.

Wilson, D., Parsons, J. and Tucker, G. (2000). The SF-36 summary scales: problems and solutions. Sozial-Und Praventivmedizin, 45, 239-246.

Wooldridge, J. M. (2010). Econometric Analysis of Cross Section and Panel Data. Cambridge: MIT Press.